

## REMARKS

In the Office Action dated May 1, 2007, claims 1-17 were presented for examination. Claims 1-6 and 12-17 were rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter. Claims 1-17 were rejected under 35 U.S.C. §101 as being inoperative. Claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §112, first paragraph as failing to comply with the enablement requirement. Claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement. Claims 12-17 were rejected under 35 U.S.C. §112, second paragraph as being incomplete for omitting essential steps. Claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §112, second paragraph as being indefinite. Claims 1-17 were rejected under 35 U.S.C. §112, second paragraph as being indefinite. Claims 1-4, 7-9, and 12-15 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Ostergard*. Claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Ostergard* in view of *Pardalos et al.* and in further view of *Szymanski et al.* Claims 1-4, 7-9 and 12-15 were rejected under 35 U.S.C. as being unpatentable over *Kevorkian*. Claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Kevorkian* in view of *Pardalos et al.*, in further view of *Szymanski*.

### **I. Claims 1-6 and 12-17 under 35 U.S.C. §101**

In the Office Action dated May 1, 2007, claims 1-6 and 12-17 were rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter.

More specifically, the Examiner alleges that the elements of claims 1, 12, and 13 are directed to an abstract idea and not to statutory subject matter. More specifically, the Examiner alleges that the claimed subject matter is not producing useful concrete results or output in that it is not grounding to any physical representation. See Office Action page 3, paragraph 3a. Applicant has amended claim 1 to include statutory subject matter in the claim. More specifically, claim 1 has been amended to define the vertex and the physical transformation of the graph to a tangible result. With respect to claim 12 and the alleged non-statutory subject matter,

Applicant has amended this claim to remove the “signal bearing medium” and to replace this language with a recordable data storage medium. It is well understood in the art that a recordable data storage medium is a physical item and as such is statutory subject matter. Accordingly, Applicant respectfully requests that the Examiner remove the rejection of claims 1-6 and 12-17 under 35 U.S.C. §101.

## **II. Rejection of Claims 1-17 under 35 U.S.C. §101**

In the Office Action dated May 1, 2007, claims 1-17 were rejected under 35 U.S.C. §101, as being inoperative and lacking utility.

More specifically, the Examiner has interpreted the language of the claims in a manner not envisioned by the Applicant. The algorithm demonstrated herein achieves a grouping of member wherein each member, including the member doing the counting is connected to each other member in the group. Applicant has amended each of the independent claims 1, 7, and 12 to define the term “maximum connectivity” as an integer associated with each node in a grouping being connected to each other node in the grouping. No new matter has been added to the specification with the amendment presented herein. Support for this amendment is found in the specification on page 1, lines 14-16. The removal process removes nodes from the grouping which have a connectivity count less than the maximum connectivity - where maximum connectivity is not limited to the quantity of nodes in the grouping. Accordingly, Applicant respectfully requests removal of the rejection of claims 1-17 under 35 U.S.C. §101.

## **III. Rejection of claims 5, 6, 10, 11, 16, and 17**

In the Office Action dated May 1, 2007, claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement.

Applicant’s invention pertains to a mathematical model to determine relationships among members of a group. In one embodiment, the members of the group may be nodes in a computer cluster that require inter-connectivity for proper operation of the cluster. In other

embodiments, the grouping may reside outside or adjacent to the computer system environment. Examples of other environments to which the invention may be applied is described in the specification on page 6, line 20 through page 7, line 18. Applicant respectfully disagrees with the Examiners opinion that the disclosure does not provide a substantive description for each of the members. As for the balance of the arguments presented by the Examiner, it is to be remembered, when rejecting a claim under the enablement requirement of 35 U.S.C. §112, the U.S. Patent and Trademark Office bears the initial burden of setting forth a reasonable explanation as to why it believes the scope of protection provided by the claimed subject matter is not adequately enabled by the description of the invention provided in the specification of the application. This includes providing sufficient reasons for doubting any assertions in the specification as to the scope of enablement. If this burden is met, the burden then shifts to the appellants to provide suitable proofs that the specification is enabling.<sup>1</sup> The only specificity provided by that Examiner pertains to the elements of “economic” and “classification” that is present in claims 6, 11, and 17, and to “combinations thereof”, that is present in claims 5, 10, and 16. Applicant have amended each of claims 6, 11, and 17 to remove the terms “economic”, “classification” and “combinations thereof”, and has amended claims 5, 10, and 16 to remove the term “combinations thereof”. It is Applicant’s position that the remaining elements in claims 5, 6, 10, 11, 16, and 17 are sufficiently disclosed in the specification. Accordingly, Applicant respectfully requests removal of the rejection of claims 5, 6, 10, 11, 16, and 17 under 35 U.S.C. §112, first paragraph.

#### **IV. Rejection of claims 5, 6, 10, 11, 16, and 17**

In the Office Action dated May 1, 2007, claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement.

More specifically, the Examiner stated that the term “combinations thereof” in these markush claims was not properly disclosed in the application. As state above, claims 5, 6, 10,

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<sup>1</sup>*In re Wright*, 999 F.2d 1557, 1561-62, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993); *In re Marzocchi*, 439 F.2d 220, 223-24, 169 USPQ 367, 369-70 (CCPA 1971).

11, 16, and 17 have been amended to remove the language “combinations thereof”. Accordingly, Applicant respectfully requests removal of the rejection of claims 5, 6, 10, 11, 16, and 17 under 35 U.S.C. §112, first paragraph.

**V. Rejection of claims 12-17 under 35 U.S.C. §112, second paragraph**

In the Office Action dated May 1, 2007, claims 12-17 were rejected under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential steps.

More specifically, the Examiner alleges that the comparison step of each node to the maximum connectivity count has been omitted from the claims. Applicant has amended claim 12 to include the limitation of comparing the connectivity count of a vertex with the maximum connectivity count in the graph. Accordingly, Applicant respectfully requests that the Examiner remove the rejection of claims 12-17 under 35 U.S.C. §112, second paragraph.

**VI. Rejection of claims 5, 6, 10, 11, 16, and 17 under 35 U.S.C. §112, second paragraph**

In the Office Action dated May 1, 2007, claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential steps.

As noted above, Applicant has amended each of these claims. The remaining elements in these claims are properly disclosed in the application. The invention pertains to maintaining a group of interconnected nodes wherein the traits of the elements that link them together are not the claimed subject matter. Applicant respectfully disagrees with the Examiner’s position that each of the elements in the markush must be in the same field of endeavor. In one set of the markush, claims 5, 10, and 16, Applicant is claiming the vertexes, and in the second set of the markush, claims 6, 11, and 17, Applicant is claiming the subject matter of the graph itself. In one example with respect to claims 5, 10, and 16, Applicant specifically claims that the inter-related elements may be components on a circuit board. The elements are related in that they are all elements in an electronic component. In one example with respect to claims 6, 11, and 17,

Applicant is claiming the subject matter of the graph itself. Each of the elements present in claims 5, 6, 10, 11, 16, and 17 is supported in the specification. There are no new or additional terms present in these claims that are outside of the specification. The Examiner has cited MPEP §2173.05, to support that the members of the group in the markush must possess a common property. However, this is not supported in MPEP §2173.05. Rather, the MPEP states the following:

The following sections are devoted to a discussion of specific topics where issues under 35 U.S.C. §112, second paragraph, have been addressed. These sections are not intended to be an exhaustive list of the issues that can arise under 35 U.S.C. §112, second paragraph, but are intended to provide guidance in areas that have been addressed with some frequency in recent examination practice. The court and Board decisions cited are representative. As with all appellate decisions, the results are largely dictated by the facts in each case. The use of the same language in a different context may justify a different result.

MPEP §2173.05. The MPEP §2173.05 does not appear to apply to the present case. MPEP §2173.05(h) does pertain to markush claims. It is Applicant's position that the elements in the markush grouping are related in that each element can be a vertex in a group in which total connectivity among the members is desired, as supported in the specification.

when the Markush group occurs in a claim reciting a process or a combination (not a single compound), it is sufficient if the members of the group are disclosed in the specification to possess at least one property in common which is mainly responsible for their function in the claimed relationship, and it is clear from their very nature or from the prior art that all of them possess this property.

MPEP §2173.05(h). Accordingly, Applicant respectfully requests removal of the rejection of claims 5, 6, 10, 11, 16, and 17 under 35 U.S.C. §112, second paragraph.

## **VII. Rejection of claims 1-17 under 35 U.S.C. §112, second paragraph**

In the Office Action dated May 1, 2007, claims 1-17 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly

claim the subject matter which Applicant regards as the invention.

More specifically, the Examiner raised a concern with the ambiguity of the clause “determining a maximum connectivity count”. As noted, above, Applicant has amended the independent claims to more specifically define the invention. The maximum connectivity count is determined based upon the ordering of the total connectivity count for each vertex. See Page 4, lines 19-20. Furthermore, the Examiner has raised an indefiniteness issue with respect to claim 13. Applicant has canceled claim 13, and as such, this issue is now moot.

Accordingly, based upon the amendment to the claims, Applicant respectfully request removal of the rejection of claims 1-17 under 35 U.S.C. §112, second paragraph.

### **VIII. Rejection of claims 1-4, 7-9 and 12-15 under 35 U.S.C. §103(a)**

In the Office Action dated May 1, 2007, claims 1-4, 7-9, and 12-15 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Ostergard*.

*Ostergard* pertains to an algorithm for finding a maximum clique in a graph. The term clique is defined by *Ostergard* as a set of vertices, any two of which are adjacent, and the term maximum clique is defined as the largest among all cliques in a graph. However, *Ostergard* creates their graph based upon the number of vertices in the graph. The pruning algorithm of *Ostergard* is based upon the premise of the number of vertices in the graph. In other words, *Ostergard* applies a pruning algorithm different than that of Applicant to create a graph of maximum interconnectivity whose members are all interconnected.

As noted in the Office Action, the Examiner has interpreted “maximum connectivity count” as the number of vertices in the graph. However, this is not how the term is defined in the specification. Applicant has amended the independent claims to further define this term as support in the specification. This term is defined as total connectivity in which each node in a grouping is connected to each other node in the grouping. Applicant’s total connectivity of each

node to each other node is not equivalent to *Ostergard*'s use of the total number of vertices in the graph.

To establish a rejection under 35 U.S.C. §103(a), all the claim limitations must be taught or suggested in the prior art.<sup>2</sup> If the prior art references do not teach or suggest every claim limitation of the Applicant's invention, then they do not meet every requirement under 35 U.S.C. §103(a) and are not sufficient to uphold a rejection under 35 U.S.C. §103(a).<sup>3</sup> In the present case, as stated above, the major difference between Applicant's invention and *Ostergard*, is that Applicant is applying the connectivity count to the pruning algorithm and *Ostergard* is applying the total quantity of vertices in the graph. Therefore, because *Ostergard* does not teach or suggest utilizing the connectivity count of Applicant to the pruning algorithm to create a maximum clique, the prior art reference does not teach every element of Applicant's claimed invention. Accordingly, the *Ostergard* reference is not sufficient to uphold a rejection under 35 U.S.C. §103(a).

It is clear that the algorithm of *Ostergard* does not teach the elements of creating a maximum clique graph using the connectivity count of Applicant. The Examiner has not established a *prima facie* case of obviousness with respect to the aforesaid set of claims, since the *Ostergard* reference comes short of teaching each of the elements claimed by Applicant. It is respectfully suggested that the Examiner's rejection under 35 U.S.C. §103(a) which does not contain teachings of the pending claims is without merit and must be withdrawn. Accordingly, Applicant respectfully contends that the application of *Ostergard* does not meet the standard set by the CAFC's interpretation of 35 U.S.C. §103(a), and respectfully requests that the Examiner remove the rejection and direct allowance of claims 1-4, 7-9, and 12-15.

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<sup>2</sup> MPEP §2143.03 (Citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)).

<sup>3</sup> See MPEP §2143.

**IX. Rejection of claims 5, 6, 10, 11, 16, and 17 under 35 U.S.C. §103(a)**

In the Office Action dated May 1, 2007, claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Ostergard* in view of *Pardalos et al.*, in further view of *Szymanski et al.*

Applicant's remarks pertaining to *Ostergard* from above are hereby incorporated by reference.

As noted by the Examiner, each of *Pardalos et al.* and *Szymanski et al.* pertain to a clique graphs and application of clique graphs to different forms of technology, as noted in the markush listing of the noted claims. However, none of the references applied in the rejection herein teach the claimed elements of creating a maximum clique graph based upon a maximum connectivity count. The interpretation of the term "maximum connectivity count" by the Examiner was broader than that defined by Applicant, and as reflected in the amended claims. Accordingly, *Ostergard* as well as both *Pardalos et al.* and *Szymanski et al.* fail to teach the basic premise of Applicant's claimed invention.

To establish a rejection under 35 U.S.C. §103(a), all the claim limitations must be taught or suggested in the prior art.<sup>4</sup> Claims 5, 6, 10, 11, 16, and 17 each require the limitation of the associated independent claims. If the prior art references do not teach or suggest every claim limitation of the Applicant's invention, then they do not meet every requirement under 35 U.S.C. §103(a) and are not sufficient to uphold a rejection under 35 U.S.C. §103(a).<sup>5</sup> In the present case, as stated above, the major difference between Applicant's invention and *Ostergard*, is that Applicant is applying the connectivity count to the pruning algorithm and *Ostergard* is applying the total quantity of vertices in the graph. Therefore, because *Ostergard* does not teach or suggest utilizing the connectivity count of Applicant to the pruning algorithm to create a

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<sup>4</sup> MPEP §2143.03 (Citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)).

<sup>5</sup> See MPEP §2143.

maximum clique, the prior art reference does not teach every element of Applicant's claimed invention. The *Ostergard* reference is not sufficient to uphold a rejection under 35 U.S.C. §103(a), and as such, the secondary references, which also lack the cited element, in combination are also insufficient to uphold the rejection under 35 U.S.C. §103(a). Accordingly, Applicant respectfully requests removal of the rejection of claims 5, 6, 10, 11, 16, and 17 under 35 U.S.C. §103(a).

**X. Rejection of claims 1-4, 7-9, and 12-15 under 35 U.S.C. §103(a)**

In the Office Action dated May 1, 2007, claims 1-4, 7-9, and 12-15 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Kevorkian*, U.S. Patent No. 5,446,908.

The *Kevorkian* patent pertains to parallel processing computer systems. Within the patent there is a reference to creating a maximum clique graph. However, the process of pruning a vertices does not employ the connectivity count as claimed by Applicant. The Examiner cited claim 5 of *Kevorkian* to support the pruning algorithm, however, in reviewing claim 5 there is no teaching of pruning therein. Furthermore, the Examiner cites Figs. 21A and 21B to further support the pruning algorithm. However, the pruning taught therein does not pertain to the “connectivity count” as claimed by Applicant. Rather, the pruning algorithm shown in Figs. 21A and 21B pertains to adjacent vertices, *i.e.* the physical proximity of the vertices to the root vertex. Applicant is not claiming the physical proximity of the vertices. Rather, Applicant's pruning algorithm pertains to the connectivity count.

The Examiner proceeds to interpret “maximum connectivity count” in a manner not taught by Applicants, and then continues with “analogous functionality”. However, the test for obviousness under 35 U.S.C. §103(a) is not whether the reference teaches analogous functionality, but whether the reference teaches all of the claimed elements.<sup>6</sup> The Examiner has interpreted the claims beyond the scope of the specification. Applicant has amended the claims

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<sup>6</sup>See MPEP §2143.03.

to more clearly define the invention over the prior art, and more specifically, to define the term “maximum connectivity count”. This term is defined as total connectivity in which each node in a grouping is connected to each other node in the grouping. Applicant’s total connectivity of each node to each other node is not equivalent to the total number of vertices in the graph.

To establish a rejection under 35 U.S.C. § 103(a), all the claim limitations must be taught or suggested in the prior art.<sup>7</sup> If the prior art references do not teach or suggest every claim limitation of the Applicant’s invention, then they do not meet every requirement under 35 U.S.C. § 103(a) and are not sufficient to uphold a rejection under 35 U.S.C. § 103(a).<sup>8</sup> In the present case, as stated above, the major difference between Applicant’s invention and *Kevorkian*, is that Applicant is applying the connectivity count to the pruning algorithm and *Kevorkian* is limiting the application of the pruning algorithm to adjacent vertices. Therefore, because *Kevorkian* does not teach or suggest broadening the pruning algorithm in the manner claimed by Applicant, the prior art reference does not teach every element of Applicant’s claimed invention. Accordingly, the *Kevorkian* reference is not sufficient to uphold a rejection under 35 U.S.C. § 103(a).

It is clear that the algorithm of *Kevorkian* limits the pruning algorithm to adjacent vertices and does not teach the elements of creating a maximum clique graph using the connectivity count of Applicant. The Examiner has not established a *prima facie* case of obviousness with respect to the aforesaid set of claims, since the *Kevorkian* reference comes short of teaching each of the elements claimed by Applicant. It is respectfully suggested that the Examiner’s rejection under 35 U.S.C. § 103(a) which does not contain teachings of the pending claims is without merit and must be withdrawn. Accordingly, Applicant respectfully contends that the application of *Kevorkian* does not meet the standard set by the CAFC’s interpretation of 35 U.S.C. § 103(a), and respectfully requests that the Examiner remove the rejection and direct

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<sup>7</sup> MPEP §2143.03 (Citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)).

<sup>8</sup> See MPEP §2143.

allowance of claims 1-4, 7-9, and 12-15.

**XI. Rejection of claims 5, 6, 10, 11, 16, and 17 under 35 U.S.C. §103(a)**

In the Office Action dated May 1, 2007, claims 5, 6, 10, 11, 16, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Kevorkian* in view of *Pardalos*, and in further view of *Szymanski*.

Applicant's remarks pertaining to *Kevorkian* from above are hereby incorporated by reference.

As noted by the Examiner, each of *Pardalos et al.* and *Szymanski et al.* pertain to a clique graphs and application of clique graphs to different forms of technology, as noted in the markush listing of the noted claims. However, none of the references applied in the rejection herein teach the claimed elements of creating a maximum clique graph based upon the maximum connectivity count. The interpretation of the term "maximum connectivity count" by the Examiner was broader than that defined by Applicant, and as reflected in the amended claims.

To establish a rejection under 35 U.S.C. §103(a), all the claim limitations must be taught or suggested in the prior art.<sup>9</sup> Claims 5, 6, 10, 11, 16, and 17 each require the limitation of the associated independent claims. If the prior art references do not teach or suggest every claim limitation of the Applicant's invention, then they do not meet every requirement under 35 U.S.C. §103(a) and are not sufficient to uphold a rejection under 35 U.S.C. §103(a).<sup>10</sup> In the present case, as stated above, the major difference between Applicant's invention and *Kevorkian*, is that Applicant is applying the connectivity count to the pruning algorithm and *Kevorkian* is limiting their pruning algorithm to adjacent vertices and not based upon the connectivity count. Therefore, because *Kevorkian* does not teach or suggest utilizing the connectivity count of

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<sup>9</sup> MPEP §2143.03 (Citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)).

<sup>10</sup> See MPEP §2143.

Applicant to the pruning algorithm to create a maximum clique, the prior art reference does not teach every element of Applicant's claimed invention. The *Kevorkian* reference is not sufficient to uphold a rejection under 35 U.S.C. §103(a), and as such, the secondary references in combination are also insufficient to uphold the rejection under 35 U.S.C. §103(a). Accordingly, Applicant respectfully requests removal of the rejection of claims 5, 6, 10, 11, 16, and 17 under 35 U.S.C. §103(a).

## **XII. Conclusion**

Based upon the above remarks, Applicants respectfully request consideration of the claims. It is submitted that all of the claims in the application are in condition for allowance and such action is respectfully requested. Should any questions arise in connection with this application or should the Examiner believe that a telephone conference with the undersigned would be helpful in resolving any remaining issues pertaining to this application, the undersigned respectfully requests that she be contacted at the number indicated below.

For the reasons outlined above, an allowance of this application is respectfully requested.

Respectfully submitted,  
By: /Rochelle Lieberman/  
Rochelle Lieberman  
Registration No. 39,276  
Attorney for Applicants

Lieberman & Brandsdorfer, LLC  
802 Still Creek Lane  
Gaithersburg, MD 20878-3218  
Phone: (301) 948-7775  
Fax: (301) 948-7774  
email: [rocky@legalplanner.com](mailto:rocky@legalplanner.com)

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